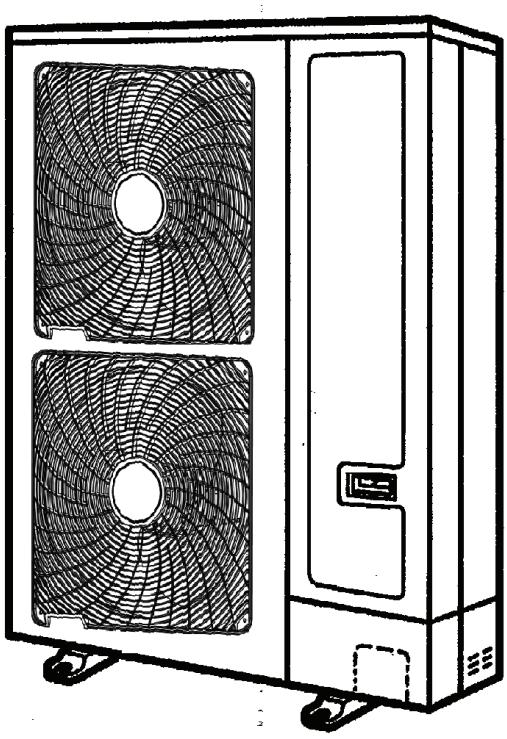
Hisense

Installation & Maintenance Manual

INVERTER-DRIVEN MULTI-SPLIT AIR CONDITIONER (HEAT PUMP)



- Outdoor Units -

MODEL
AVW - 38UCSC
AVW - 48UCSC
AVW - 54UCSC

IMPORTANT:

READ AND UNDERSTAND THIS MANUAL BEFORE USING THIS HEAT-PUMP AIR CONDITIONERS. KEEP THIS MANUAL FOR FUTURE REFERENCE.

P 0 0 4 1 5 Q

ORIGINAL INSTRUCTIONS

IMPORTANT NOTICE

- HISENSE pursues a policy of continuing improvement in design and performance of products. The right is therefore reserved to vary specifications without notice.
- HISENSE cannot anticipate every possible circumstance that might involve a potential hazard.
- This heat pump air conditioner is designed for standard air conditioning only. Do not use this heat pump air conditioner for other purposes such as drying clothes, refrigerating foods or for any other cooling or heating process.
- The installer and system specialist shall secure safety against leakage according to local regulations or standards. The following standards may be applicable if local regulations are not available. British Standard, BS4434.
- No part of this manual may be reproduced without written permission.
- Signal words (DANGER, WARNING and CAUTION) are used to identify levels of hazard seriousness. Definitions for identifying hazard levels are provided below with their respective signal words.

⚠DANGER	:	Immediate hazards which WILL result in severe personal injury or death.
⚠WARNING	:	Hazards or unsafe practices which COULD result in severe personal injury or death.
⚠CAUTION	:	Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.
NOTE	:	Useful information for operation and/or maintenance.

- It is assumed that this heat pump air conditioner will be operated and serviced by English speaking people. If this is not the case, the customer should add safety, caution and operating signs in the native language.
- If you have any questions, contact your distributor or dealer of HISENSE.
- This manual gives a common description and information for this heat pump air conditioner which you operate as well as for other models.
- Install these air conditioners by local regulations or standards.
- This heat pump air conditioner has been designed for the following temperatures. Operate the heat pump air conditioner within this range.

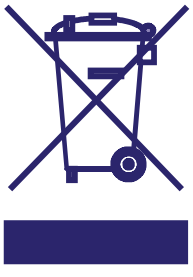
Temperature (°C)

		Maximum	Minimum
Cooling Operation	Indoor	23WB	15WB
	Outdoor	46 DB	-5 DB
Heating Operation	Indoor	30 DB	15 DB
	Outdoor	15.5 WB	-20 WB

DB: Dry Bulb, WB: Wet Bulb

NOTE:
These air conditioners only are appliable of cooling or heating mode,do not operate cool and heat mode together, if operate cool and heat mode at the same time,air conditioner system will be fluctuated for large difference in temperature for changing operate mode.

This manual should be considered as a permanent part of the air conditioning equipment and should remain with the air conditioning equipment.



Correct Disposal of this product

This marking indicates that this product should not be disposed with other household wastes. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.

SAFETY SUMMARY

⚠ DANGER

- **Use refrigerant R410A in the refrigerant cycle. Do not charge oxygen, acetylene or other flammable and poisonous gases into the refrigerant cycle when performing a leakage test or an air-tight test. These types of gases are extremely dangerous and can cause an explosion. It is recommended that compressed air, nitrogen or refrigerant be used for these types of tests.**
- **Do not pour water into the indoor or outdoor unit. These products are equipped with electrical parts. If poured, it will cause a serious electrical shock.**
- **Do not touch or adjust safety devices inside the indoor or outdoor units. If these devices are touched or readjusted, it may cause a serious accident.**
- **Do not open the service cover or access panel for the indoor or outdoor units without turning OFF the main power supply.**
- **Refrigerant leakage can cause difficulty with breathing due to insufficient air. Turn OFF the main switch, extinguish any naked flames and contact your service contractor, if refrigerant leakage occurs.**
- **The installer and system specialist shall secure safety against refrigerant leakage according to local regulations or standards.**
- **Use an ELB (Electric Leakage Breaker). In the event of a fault, there is danger of an electric shock or a fire if it is not used.**
- **Do not install the outdoor unit where there is a high level of oil mist, flammable gases, salty air or harmful gases such as sulphur.**

⚠ WARNING

- **Do not use any sprays such as insecticide, lacquer, hair spray or other flammable gases within approximately one (1) meter from the system.**
- **If circuit breaker or fuse is often activated, stop the system and contact your service contractor.**
- **Do not perform installation work, refrigerant piping work, drain piping and electrical wiring connection without referring to our installation manual. If the instructions are not followed, it may result in a water leakage, electric shock or a fire.**
- **Check that the ground wire is securely connected. If the unit is not correctly grounded, it lead electric shock. Do not connect the ground wiring to gas piping, water piping, lightning conductor or ground wiring for telephone.**
- **Connect a fuse of specified capacity.**
- **Do not put any foreign material on the unit or inside the unit.**
- **Make sure that the outdoor unit is not covered with snow or ice, before operation.**
- **Before performing any brazing work, check to ensure that there is no flammable material around.**
  When using refrigerant be sure to wear leather gloves to prevent cold injuries.
- **Protect the wires, electrical parts, etc. from rats or other small animals.**
  If not protected, rats may gnaw at unprotected parts and which may lead to a fire.
- **Fix the cables securely. External forces on the terminals could lead to a fire.**

SAFETY SUMMARY

⚠CAUTION

- **Do not install the indoor unit, outdoor unit, remote control switch and cable within approximately 3 meters from strong electromagnetic wave radiators such as medical equipment.**
- **Supply electrical power to the system to energize the oil heater for 12 hours before start-up after a long shutdown.**
- **Do not step or put any material on the product.**
- **Provide a strong and correct foundation so that;**
  a. The outdoor unit is not on an incline.
  b. Abnormal sound does not occur.
  c. The outdoor unit will not fall down due to a strong wind or earthquake.
- **The appliance is not to be used by children or person with reduced physical, sensory or mental capabilities,or lack of experience and knowledge,unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.**
- **Children should be supervised they do not play with the appliance.**

NOTE:

- **It is recommended that the room be ventilated every 3 to 4 hours.**
- **The heating capacity of the heat pump unit is decreased according to the outdoor air temperature. Therefore, it is recommended that auxiliary heating equipment be used in the field when the unit is installed in a low temperature region.**
- **Operate the heat pump air conditioner within this range.**
  Regarding installation altitude below 1000 meters;
  Regarding frequency of supply power within ±1% Hz of rated frequency.
  Regarding transport storage temperature within -25~55℃.

CHECKING PRODUCT RECEIVED

- **Upon receiving this product, inspect it for any shipping damage.**
  Claims for damage, either apparent or concealed, should be filed immediately with the shipping company.
- **Check the model number, electrical characteristics (power supply, voltage and frequency) and accessories to determine if they are correct.**
- **The standard utilization of the unit shall be explained in these instructions.**
- **Therefore, the utilization of the unit other than those indicated in these instructions is not recommended.**
- **Please contact your local agent, as the occasion arises.**
- **HISENSE's liability shall not cover defects arising from the alteration performed by a customer without HISENSE's consent in a written form.**

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1. Safety Summary

⚠WARNING

- **Do not perform installation work, refrigerant piping work, drain piping and electrical wiring connection without referring to the installation manual.**
- **Check that the ground wire is securely connected.**
- **Connect a fuse of specified capacity.**

⚠CAUTION

Do not install the indoor unit, outdoor unit, remote control switch and cable within approximately 3 meters from strong electromagnetic wave radiators such as medical equipment.

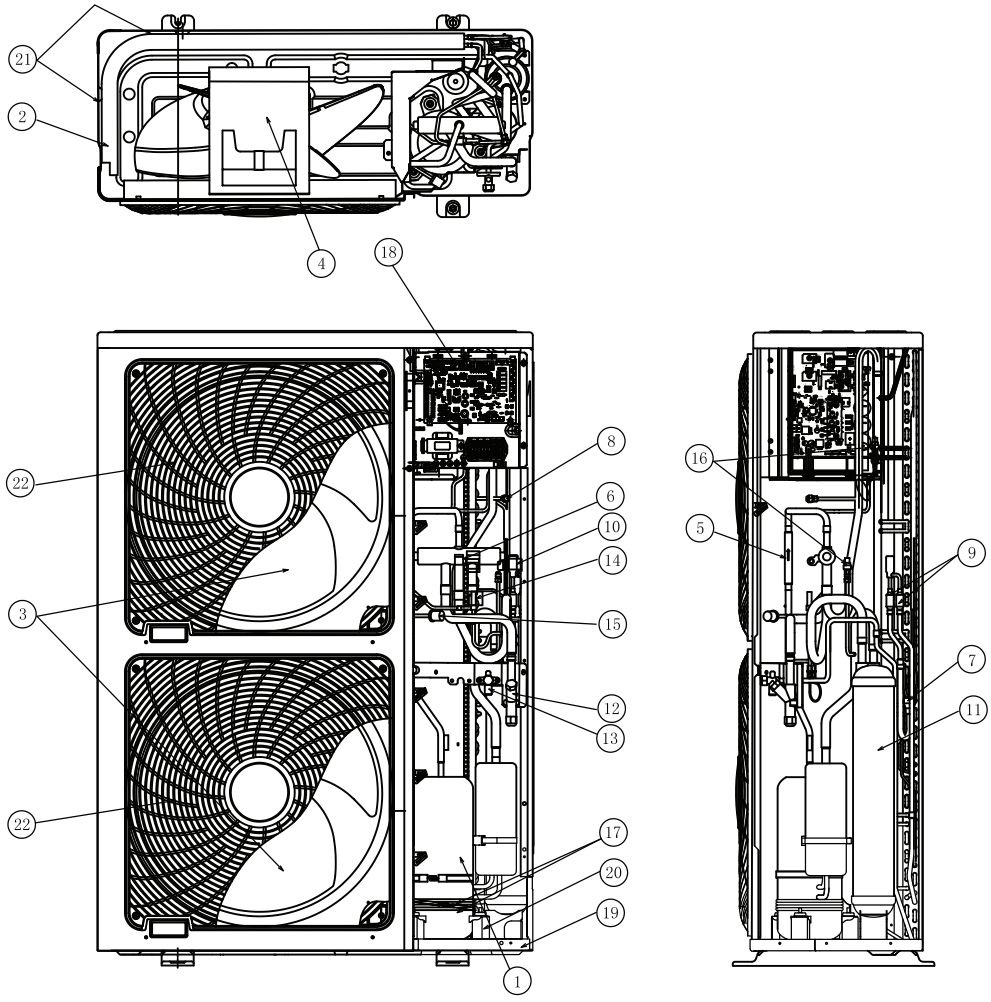
Table 1.1 Line-Up of Outdoor Unit

Capacity(KBtu/h)	38	48	54
Model	AVW-38UCSC	AVW-48UCSC	AVW-54UCSC

2. Structure

2.1 Outdoor Unit & Refrigerant Cycle

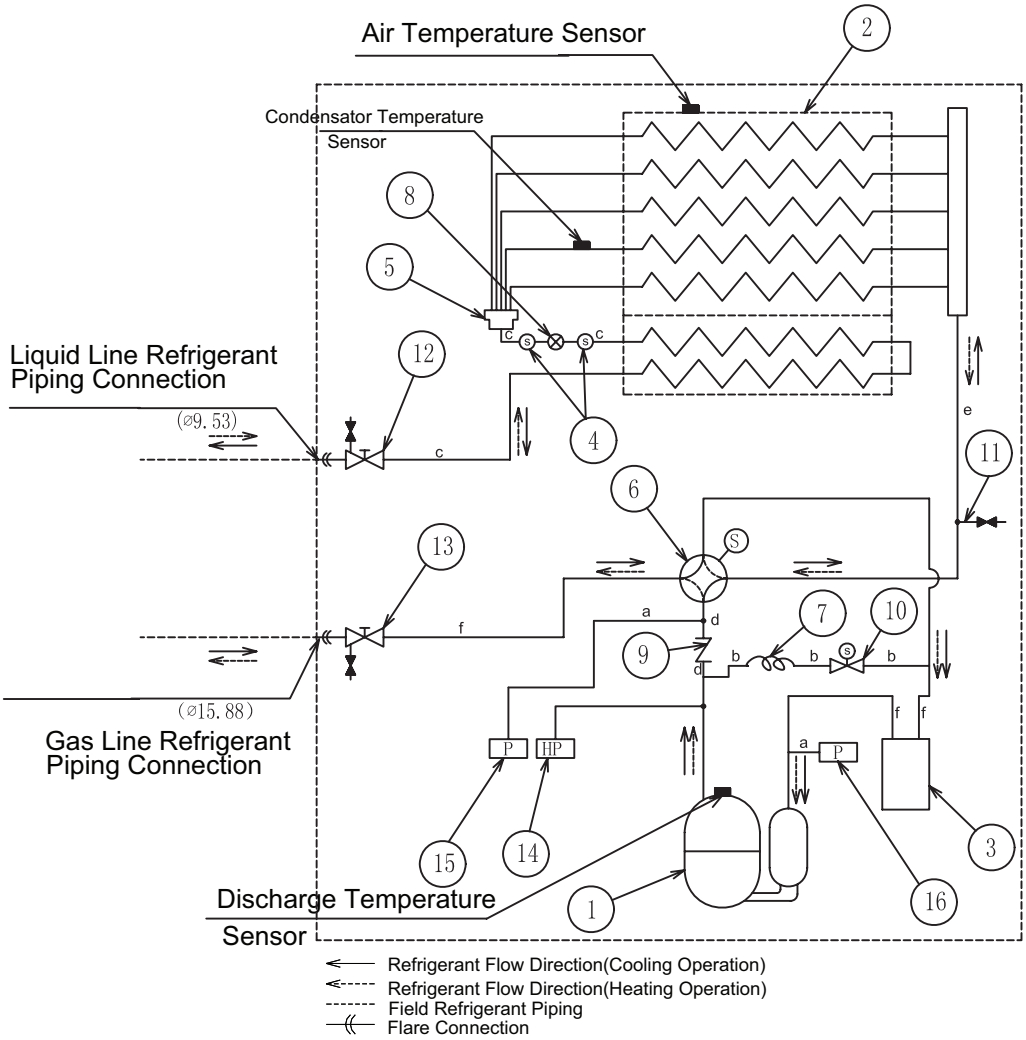
<Outdoor Unit>



No.	Part Name	No.	Part Name
1	Compressor	14	Bypass Solenoid Valve
2	Heat Exchanger	15	High Pressure Switch
3	Propeller Fan	16	Pressure Sensor
4	Fan Motor	17	Crankcase Heater
5	Check Valve	18	Electrical Box
6	Reversing Valve	19	Base assembly
7	Distributor	20	Vibration Absorbing Rubber
8	Check Joint for High/Low Pressure(Cool/Heat)	21	Air Inlet
9	Strainer	22	
10	Electrical Expansion Valve	23	
11	Gas & Liquid Separator	24	
12	Stop Valve for Gas Line	25	
13	Stop Valve for Liquid Line	26	

<Refrigerant Cycle>

Outdoor Unit



NO.	Part Name	Remark
1	Compressor	
2	Heat Exchanger	
3	Gas & Liquid Separator	
4	Strainer	
5	Distributor	
6	Reversing Valve	
7	Capilary Tube	Bypass
8	Electrical Expansion Valve	
9	Check Valve	
10	Solenoid Valve	Bypass
11	Check Joint	
12	Stop Valve for Liquid Line	
13	Stop Valve for Gas Line	
14	Pressure Switch	High Pressure Protect
15	Pressure Sensor	High Pressure
16	Pressure Sensor	Low Pressure

NO.	O.D.×T	Material
a	Φ6.35 ×0.7 t	C1220T-0
b	Φ6.35 ×1.07 t	
c	Φ9.53 ×0.8 t	
d	Φ12.7 ×1.0 t	
e	Φ15.88 ×1.0 t	
f	Φ15.88 ×1.2 t	

2.2 Necessary Tools and Instrument List for Installation

No.	Tool	No.	Tool	No.	Tool	No.	Tool
1	Handsaw	6	Copper Pipe Bender	11	Spanner	16	Leveller
2	Phillips Screwdriver	7	Manual Water Pump	12	Charging Cylinder	17	Clamper for Solder-less Terminals
3	Vacuum Pump	8	Pipe Cutter	13	Gauge Manifold	18	Hoist (for Indoor Unit)
4	Refrigerant Gas Hose	9	Brazing Kit	14	Cutter for Wires	19	Ammeter
5	Megohmmeter	10	Hexagon Wrench	15	Gas Leak Detector	20	Voltage Meter

Use tools and measuring instruments only for the new refrigerant which is directly touch to refrigerant.

✧: Interchangeability is available with current R22
×: Prohibited
●: only for Refrigerant R410A (No Interchangeability with R22)
✦: only for Refrigerant R407C (No Interchangeability with R22)

Measuring Instrument and Tool		Interchangeability with R22		Reason of Non-Interchangeability and Attention (★: Strictly Required)	Use
		R410A	R407C		
Refrigerant Pipe	Pipe Cutter Chamfering Reamer	✧	✧	-	Cutting Pipe Removing Burrs
	Flaring Tool	✧ ●	✧	* The flaring tools for R407C are applicable to R22.	Flaring for Tubes
	Extrusion Adjustment Gauge	●	-	* If using flaring tube, make dimension of tube larger for R410A. * In case of material 1/2H, flaring is not available.	Dimensional Control for Extruded Portion of Tube after Flaring
	Pipe Bender	✧	✧	* In case of material 1/2H, bending is not available. Use elbow for bend and braze.	Bending
	Expanding Tool	✧	✧	* In case of material 1/2H, expanding of tube is not available. Use socket for connecting tube.	Expanding Tubes
	Torque Wrench	●	✧	* For ϕ12.7, ϕ15.88, spanner size is up 2mm.	Connection of Flare Nut
		✧	✧	* For ϕ6.35, ϕ9.53, ϕ19.05, spanner size is the same.	
	Brazing Tool	✧	✧	* Perform correct brazing work.	Brazing for Tubes
	Nitrogen Gas	✧	✧	* Strict Control against Contamin (Blow nitrogen during brazing.)	Prevention from Oxidation during Brazing
	Lubrication Oil (for Flare Surface)	●	✦	* Use a synthetic oil which is equivalent to the oil used in the refrigeration cycle. * Synthetic oil absorbs moisture quickly.	Applying Oil to the Flared Surface
Vacuum Drying . Refrigerant Charge	Refrigerant Cylinder	●	✦	* Check refrigerant cylinder color. ★ Liquid refrigerant charging is required regarding zeotoropic refrigerant.	Refrigerant Charging
	Vacuum Pump	✧	✧	★ The current ones are applicable. However, it is required to mount a vacuum pump adapter which can prevent from reverse flow when a vacuum pump stops, resulting in no reverse oil flow.	Vacuum Pumping
	Adapter for Vacuum Pump	✳ ●	✦		
	Manifold Valve	●	✦	* No interchangeability is available due to higher pressures when compared with R22.	Vacuum Pumping, Vacuum Holding, Refrigerant Charging and Check of Pressures
	Charging Hose	●	✦	★ Do not use current ones to the different refrigerant. If used, mineral oil will flow into the cycle and cause sludges, resulting in clogging or compressor failure. Connection diameter is different; R410A: UNF1/2, R407C: UNF7/16.	
	Charging Cylinder	×	×	* Use the weight scale.	-
	Weight Scale	✧	✧	-	Measuring Instrument for Refrigerant Charging
	Refrigerant Gas Leakage Detector	✳ ●	✦	* The current gas leakage detector (R22) is not applicable due to different detecting method.	Gas Leakage Check

✳: Interchangeability with R407C.

3. Transportation and Handling

3.1 Indoor Unit&Outdoor Unit Matching

● Below Indoor Unit matching Hi Smart L outdoor unit.

Table 3.1 Indoor Unit Model

Indoor Unit	Rated Capacity (KBtu/h)							
	07	09	12	14	17	18	22	24
Ceiling Ducted Type High Static Pressure	○	○	○	○	○	○	○	○
Ceiling Ducted Type Low Static Pressure	○	○	○	○	○	○	○	○
Low-height Ceiling Ducted Type	○	○	○	○	○	○	○	○
Slim Ceiling Ducted Type	○	○	○	○				
4-Way Cassette Type		○	○	○	○	○	○	○
Wall-Mounted Type		○		○				

○ : Allow

● Indoor Unit total Capacity must be 50% to 130% for Outdoor Unit Rated Capacity

Table 3.2 System Matching

Outdoor Unit Model Capacity(KBtu/h)	Rated Capacity(KBtu/h)			
	Min. Matching Capacity (KBtu/h)	Max. Matching Capacity (KBtu/h)	Matching Quantity	Min. Single Operate Capacity (KBtu/h)
38	19	24	2 to 6	07
48	24	62	2 to 7	07
54	27	70	2 to 7	07

3.2 Transportation

Transport the product as close to the installation location as practical before unpacking.

⚠CAUTION

Do not put any material on the product.
Apply two lifting wires onto the outdoor unit, when lifting it by crane.

● Hanging Method
When hanging the unit, ensure a balance of the unit, check safety and lift up smoothly.

(1) Do not remove any packing materials.

(2) Hang the unit under packing condition with two (2) ropes, as shown in Fig. 3.1.

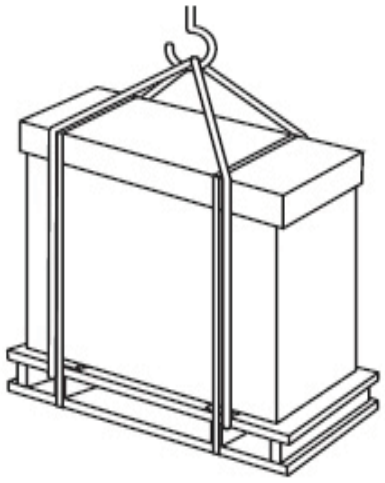


Fig. 3.1 Hanging Work for Transportation

⚠CAUTION

If have no package to move,Please protect with cloth or paper

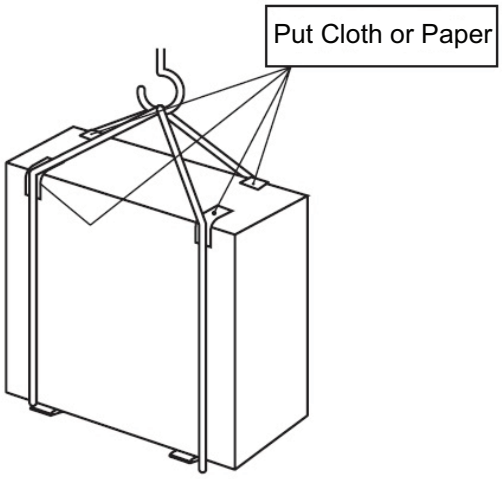


Fig.3.2 Transportation for no wooden base

(kg)

Outdoor Unit Model (KBtu/h)	Net Weight
38	93
48	95
54	97

⚠WARNING

Do not put any foreign material into the outdoor unit and check to ensure that none exists in the outdoor unit before the installation and test run. Otherwise, a fire or failure, etc. may occur.

4. Outdoor Unit Installation

4.1 Factory-Supplied Accessories

Check to ensure that the following accessories are packed with the outdoor unit.

Table 4.1 Factory-Supplied Accessories

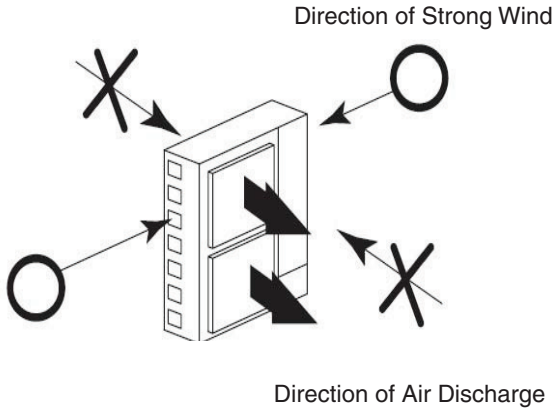
Accesso	Q'ty	Recommend
Washer	4	for Anchor Bolts

NOTE

If any of these accessories are not packed with the unit, please contact your contractor.

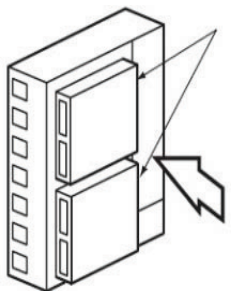
4.2 Initial Check

- Install the outdoor unit where good ventilation is available, and where it is dry.
- Install the outdoor unit where the sound or the discharge air from the outdoor unit does not affect neighbors or surrounding vegetation. The operating sound at the rear or right/left sides is higher than the value in the catalog at the front side.
- Check to ensure that the foundation is flat, level and sufficiently strong.
- Do not install the outdoor unit where there is a high level of oil mist, salty air or harmful gases such as sulphur.
- Do not install the outdoor unit where the electromagnetic wave is directly radiated to the electrical box.
- Install the outdoor unit as far as practical, being at least 3 meters from the electromagnetic wave radiator.
- When installing the outdoor unit in snow-covered areas, mount the field-supplied hoods at the discharge side of the outdoor unit and the inlet side of the heat exchanger.
- Install the outdoor unit where it is in the shade or it will not be exposed to direct sunshine or direct radiation from high temperature heat source.
- Do not install the outdoor unit where dust or other contamination could block the outdoor heat exchanger.
- Install the outdoor unit in a space with limited access to general public.
- Do not install the outdoor unit in a space where a seasonal wind directly blows to the outdoor heat exchanger or a wind from a building space directly blows to the outdoor fan.



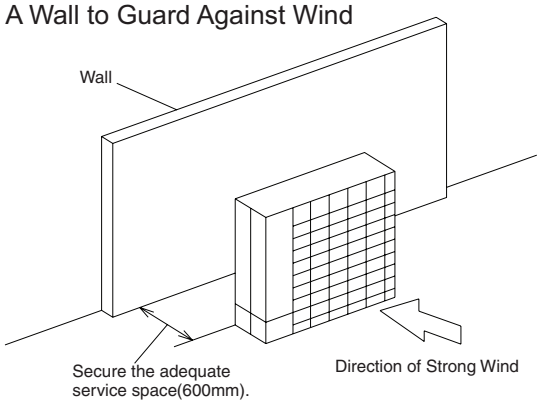
- In case of installation in the open spaces unavoidably where there is no buildings or surrounding structures, adopt the wind guard set or install near the wall to avoid facing the wind directly. Ensure that the service space should be secured.

(1) Using Wind Guard



Model	Quantity
HWSP-160A	1

(2) A Wall to Guard Against Wind



NOTE:
If the extreme strong wind blows directly against the air discharge portion, the fan may rotate reversely and be damaged.

⚠CAUTION

Aluminum fins have very sharp edges. Pay attention to the fins to avoid any injury.

NOTE

Install the outdoor unit on a roof or in an area where people except service engineers can not touch the outdoor unit.

4.3 Service Space

Install the outdoor unit with a sufficient space around the outdoor unit for operation and maintenance as shown below Fig4.1.

(mm)

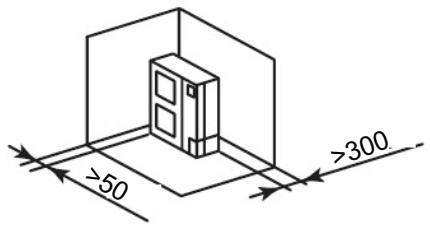
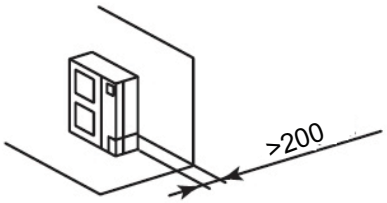
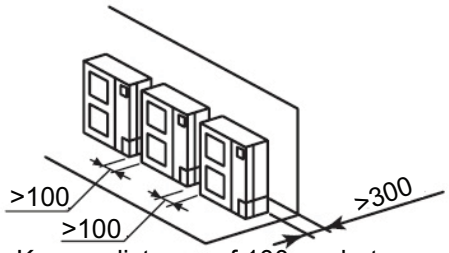
Single Installation	Single Installation	Multiple Installation
Upper Side is Open	Left,Right&Upper Side is Open	
		
Keep a distance of 100mm between right side at least		Keep a distance of 100mm between right side at least

Fig. 4.1 Installation Space

4.4 Installation Work

(1) Secure the outdoor unit with the anchor bolts.

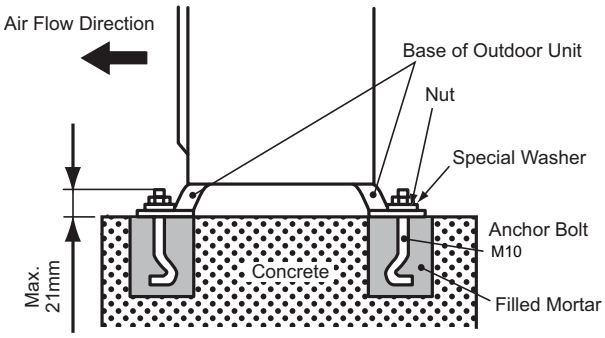


Fig. 4.2 Installation of Anchor Bolts

Fix the outdoor unit to the anchor bolts by special washer of factory-supplied accessory.

(2) When installing the outdoor unit, fix the unit by anchor bolts. Refer to Fig. 4.3

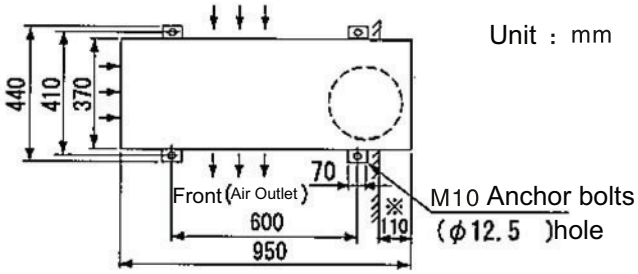


Fig. 4.3 Position of Anchor Bolts

NOTE:
When the mark * dimension is secured, piping work from bottom side is easy without interference of foundation.

(3) Example of fixing outdoor unit by anchor bolts.

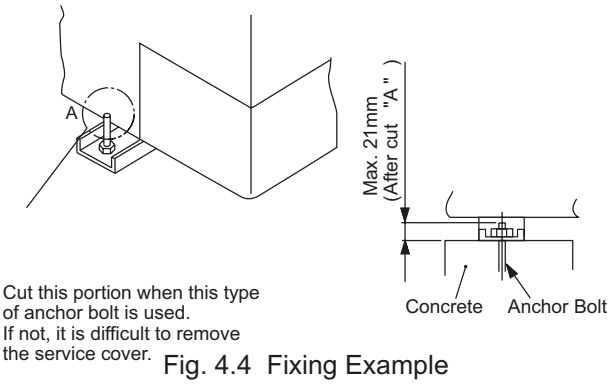

A
Max. 21mm
(After cut "A")
Concrete
Anchor Bolt
Cut this portion when this type of anchor bolt is used.
If not, it is difficult to remove the service cover.

Fig. 4.4 Fixing Example

(4) Fix the outdoor unit firmly so that declining, making noise, and falling down by strong wind or earthquake is avoided.

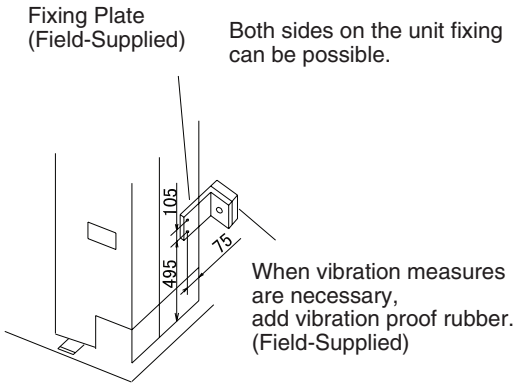
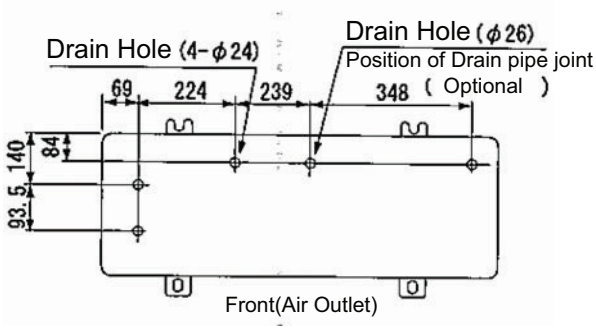


Fig. 4.5 Additional Fixing Arrangement

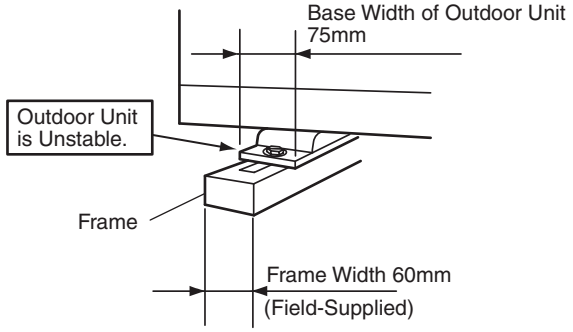
(5) When installing the unit on a roof or a veranda, drain water sometimes turns to ice in a cold morning. Therefore, avoid draining in an area where people often use because it is slippery.

(6) In case of the drain piping is necessary for the outdoor unit, use the drain-kit (HDBS-26 or HDBS-26L:Optional Parts) .

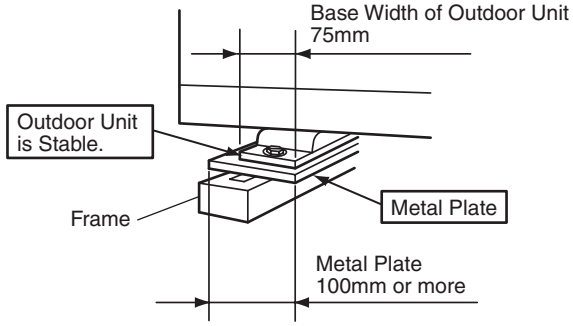


(7) The whole of the base of the outdoor unit should be installed on a foundation. When using vibration-proof mat, it should also be positioned the same way.
When installing the outdoor unit on a field-supplied frame, use metal plates to adjust the frame width for stable installation as shown in Fig. 4.6.

Incorrect



Correct



Recommended Metal Plate Size (Field-Supplied)

Material: Hot-Rolled Mild Steel Plate (SPHC)
Plate Thickness: 4.5T

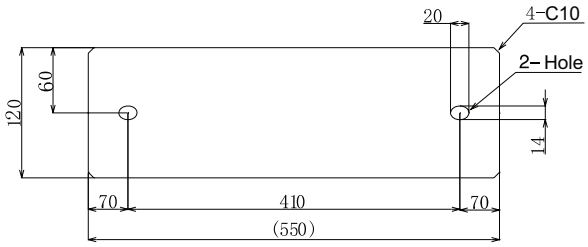


Fig. 4.6 Frame and Base Installation

5. Refrigerant Piping Work

⚠ DANGER

Use refrigerant R410A in the refrigerant cycle. Do not charge oxygen, acetylene or other flammable and poisonous gases into the refrigerant cycle when performing a leakage test or an air-tight test. These types of gases are extremely dangerous and can cause an explosion. It is recommended that compressed air, nitrogen or refrigerant be used for these types of tests.

5.1 Piping Materials

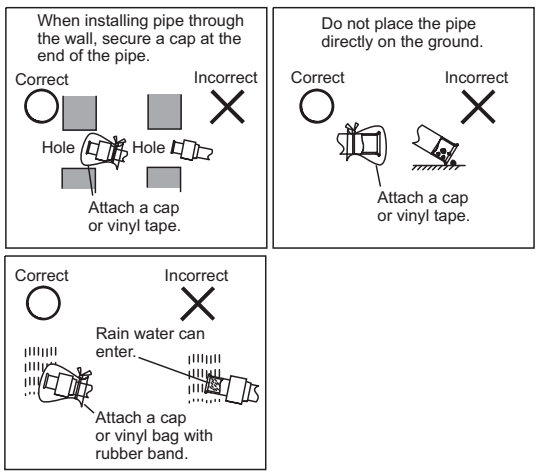
(1) Prepare locally-supplied copper pipes.

(2) Select the piping size from the Table 5.1.

(3) Select clean copper pipes. Make sure there is no dust and moisture inside of the pipes. Blow the inside of the pipes with nitrogen or dry air, to remove any dust or foreign materials before connecting pipes.

NOTE

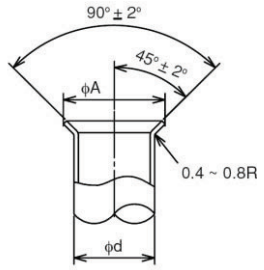
● Cautions for Refrigerant Pipe Ends


When installing pipe through the wall, secure a cap at the end of the pipe.
Correct
Incorrect
Hole
Hole
Attach a cap or vinyl tape.
Do not place the pipe directly on the ground.
Correct
Incorrect
Attach a cap or vinyl tape.
Correct
Incorrect
Rain water can enter.
Attach a cap or vinyl bag with rubber band.

⚠CAUTION

- **Cap the end of the pipe when the pipe is to be inserted through a hole.**
- **Do not put pipes on the ground directly without a cap or vinyl tape at the end of the pipe.**

- Flaring Dimension
  Perform the flaring work as shown below.



(mm)

Diameter Φd	$A^{+0}_{-0.4}$ R410A
6.35	9.1
9.53	13.2
12.7	16.6
15.88	19.7

- Piping Thickness and Material
  Use the pipe as below.

(mm)

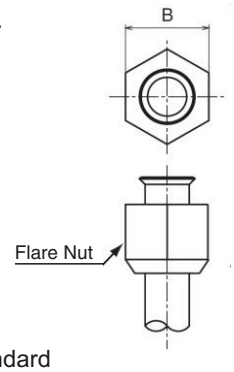
Diameter	R410A	
	Thickness	Material
ϕ6.35	0.8	0
ϕ9.53	0.8	0
ϕ12.7	0.8	0
ϕ15.88	1.0	0

Material is based on a JIS standard (JIS B8607).

- Flare Nut Dimension
  Use the flare nut as below.

<Flare Nut Dimension B (mm)

Diameter	R410A
ϕ6.35	17
ϕ9.53	22
ϕ12.7	26
ϕ15.88	29



Dimension is based on a JIS standard (JIS B8607).

5.2 Refrigerant Piping Work

(1) Ensure that the directions for refrigerant piping work according to the tables.

Table 5.1 Limitation of Outdoor Unit

Diameter / Capacity (KBtu/h)	Outer Diameter of Pipe (mm)		
	Gas	Liquid	Branch Pipe
38	ϕ15.88	ϕ9.53	HFQ-052F
48			
54			

Table 5.2 Indoor Unit Pipe Model

Indoor Unit Pipe Model	Gas Pipe	Liquid Pipe
07~14	ϕ12.7 (1/2)	ϕ 6.35 (1/4)
17~18	ϕ15.88 (5/8)	ϕ 6.35 (1/4)
22~24	ϕ 15.88 (5/8)	ϕ 9.53 (3/8)

(2) Additional Refrigerant Charge R410A

Although refrigerant has been charged into this unit, it is required that additional refrigerant be charged according to piping length.

Table 5.3 W_0 is Outdoor Unit Ref.charge before shipment

Outdoor Unit Model Capacity(KBtu/h)	W_0 (kg)
38	3.8
48	3.8
54	4.1

- Calculate charge refrigerant quantity by liquid pipe length,charge it to refrigerant cycle.

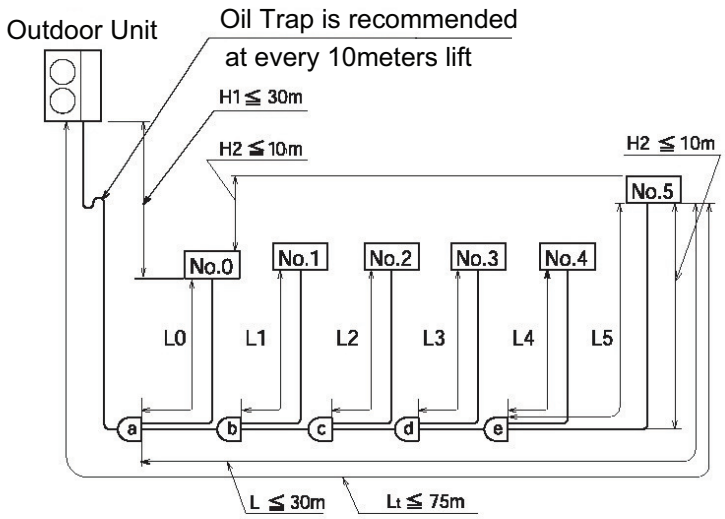
  W11(kg): (ϕ9.53 liquid length , m) × 0.04

  W12(kg): (ϕ6.35 liquid length , m) × 0.02

  W=W11+W12

- Inform local service the quantity of charging refrigerant after finish charging.

Table 5.4 Refrigerant Pipe System&Additional Refrigerant Quantity

<table>
<tr><td colspan="2">System / Item</td><td colspan="3">Branch pipe for Line Branch</td></tr>
<tr><td colspan="2">Example
One outdoor unit joint six indoor units, pipe materials are acquired from local</td><td colspan="3"> 
</td></tr>
<tr><td rowspan="2">Max.Pipe Length</td><td>Max.Saving Length Lt</td><td colspan="3">Lt≦75m</td></tr>
<tr><td>Total Pipe Lentth
Lto =Lt+L0+L1+L2+L3+L4</td><td colspan="3">Lto≦120m</td></tr>
<tr><td rowspan="2">High Distance between Outdoor and Indoor Unit</td><td>Outdoor is Higher than Indoor Unit</td><td colspan="3">H1≦30m</td></tr>
<tr><td>Indoor is Higher than Outdoor Unit</td><td colspan="3">H1≦30m</td></tr>
<tr><td colspan="2">Max.High Distance betwen Indoor and Indoor or Indoor and Branch Pipe</td><td colspan="3">H2≦10m</td></tr>
<tr><td rowspan="2">Max.Pipe Length between Branch Pipe and Indoor</td><td>From "a" Branch Pipe to Indoor of Max. Distance</td><td colspan="3">L≦30m</td></tr>
<tr><td>From every Branch Pipe to Indoor of connecting</td><td colspan="3">L0,L1,L2,L3,L4,L5≦10m</td></tr>
<tr><td>Choose Branch Pipe(KBtu/h)</td><td>38~54</td><td colspan="3">“a、b、c、d、e” with HFQ-052F</td></tr>
<tr><td rowspan="2">Total refrigerant charge of this system is calculted in the following formula.

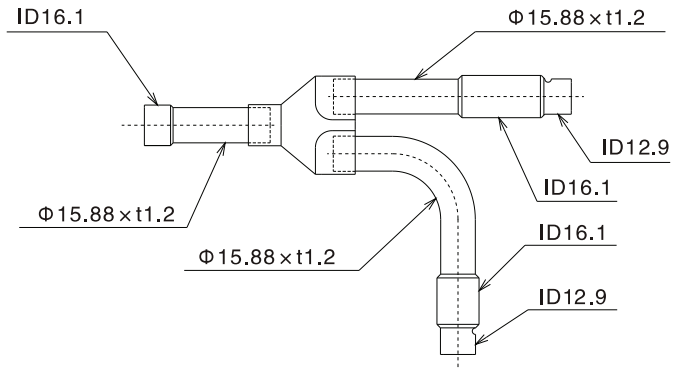
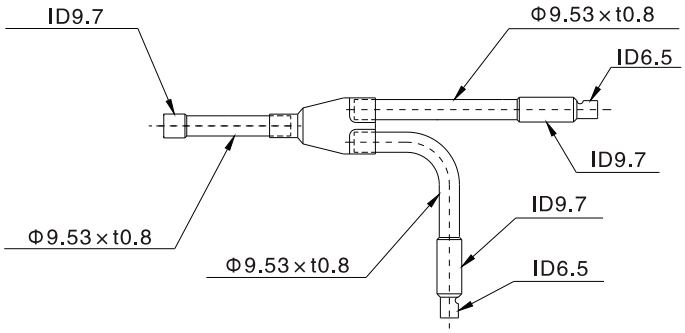
W =W11+ W12(kg)
thereinto
W11(kg)= φ9.53 Total Liquid Length(m) ×0.04
W12(kg)= φ6.35 Total Liquid Length(m) ×0.02</td><td>Liquid Pipe</td><td colspan="3"><Example>
(AVW-54UCSC)

<table>
<tr><td>Symbol</td><td>Lt-L5</td><td>L0</td><td>L1</td><td>L2</td><td>L3</td><td>L4</td><td>L5</td></tr>
<tr><td>Model</td><td>φ9.53</td><td>φ6.35</td><td>φ6.35</td><td>φ6.35</td><td>φ6.35</td><td>φ6.35</td><td>φ6.35</td></tr>
<tr><td>Length</td><td>21</td><td>5</td><td>3</td><td>5</td><td>3</td><td>5</td><td>3</td></tr>
</table>

W11=21×0.04=0.84kg
W12=(5+3+5+3+5+3)×0.02=0.48kg</td></tr>
<tr><td>Total</td><td colspan="3">W =W11+ W12(kg) =1.32kg</td></tr>
</table>

5.3 Branch Pipe for Line Branch

Table 5.5 T Shape Branch Pipe

Branch Pipe	HFQ-052F
Gas Line	
Liquid Line	

Unit：mm， ID: Inner Diameter，OD: Outer Diameter

5.4 Piping Connection

Pipes can be connected from 4 directions.

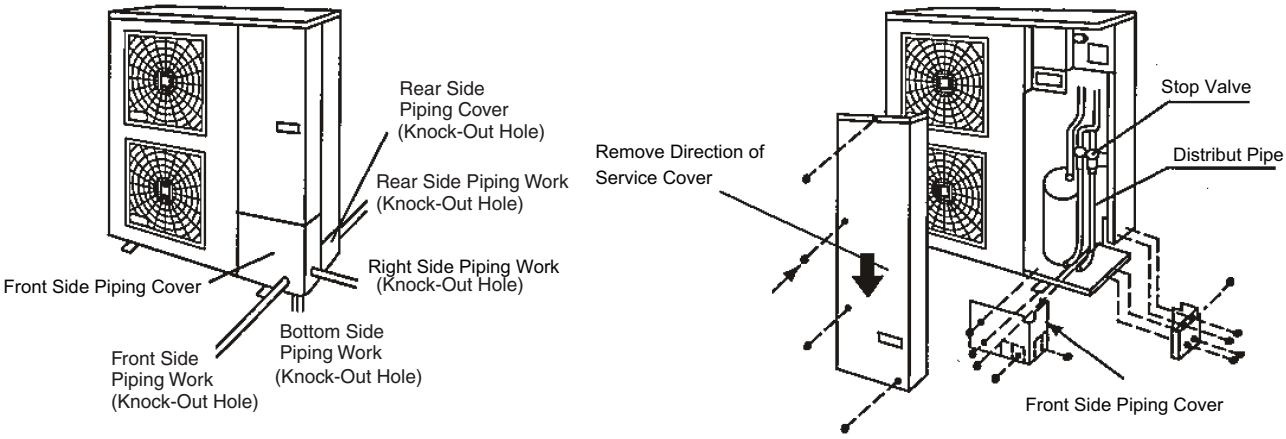


Fig. 5.1 Piping Direction

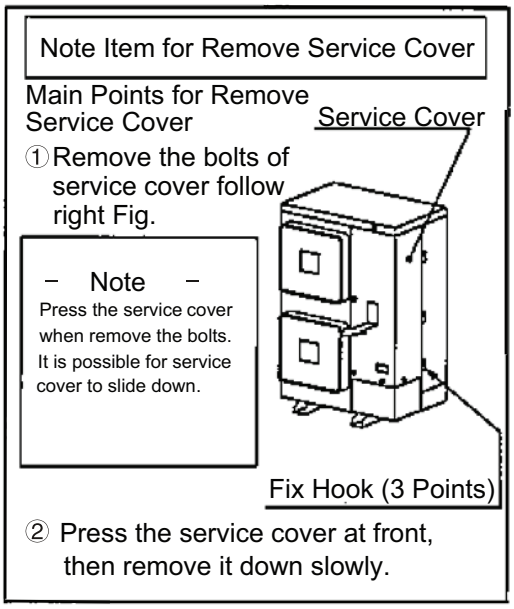
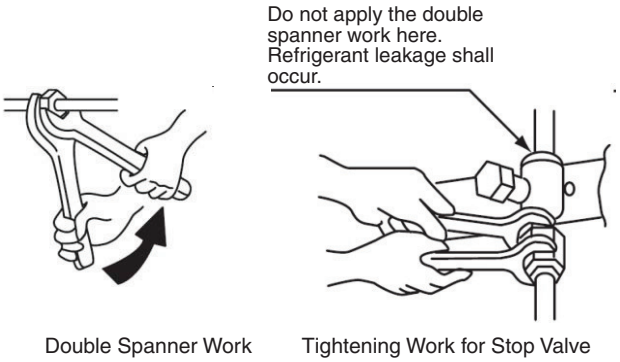

Note Item for Remove Service Cover
Main Points for Remove
Service Cover
Service Cover
① Remove the bolts of
service cover follow
right Fig.
– Note –
Press the service cover
when remove the bolts.
It is possible for service
cover to slide down.
Fix Hook (3 Points)
② Press the service cover at front,
then remove it down slowly.

Fig. 5.2 Remove Service Cover

(1) Confirm that the valve is closed.

(2) Prepare a field-supplied bend pipe for liquid line. Connect it to the liquid valve by flare nut through the square hole of bottom base.

(3) For Gas Piping Connection
Prepare a field-supplied bend pipe for gas line. Braze it and the factory-supplied pipe flange at the outside of the unit.

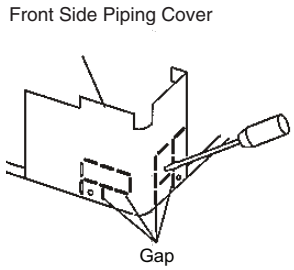


Double Spanner Work Tightening Work for Stop Valve

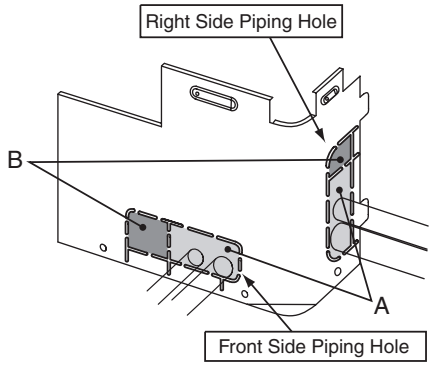
Table 5.6 Tightening Torque for Flare Nut

Pipe Size	Torque
Φ6.35(1/4)	20N・m (2kgf・m)
Φ9.53(3/8)	40N・m (4kgf・m)
Φ12.7(1/2)	60N・m (6kgf・m)
Φ15.88(5/8)	80N・m (8kgf・m)

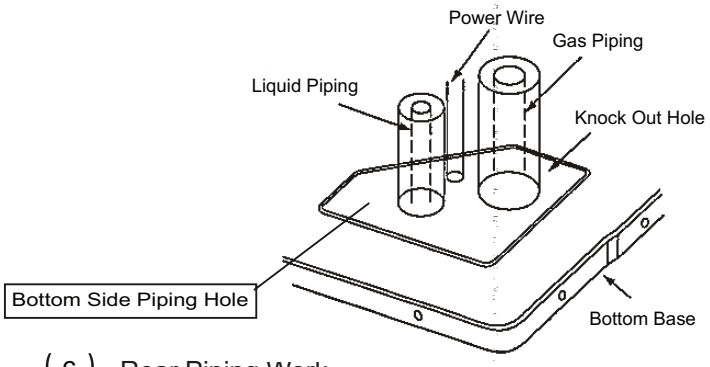
(4) Pipes can be connected from 4 directions as shown Fig. 5.1. Make a knock-out hole in the front pipe cover or bottom base to pass through the hole.
After removing the pipe cover from the unit, punch out the holes following the guide line with screwdriver and a hammer.
Then, cut the edge of the holes and attach insulation (Field-Supplied) for cables and pipes protection.



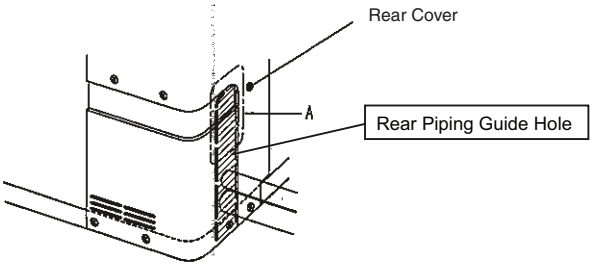
(a) Connect Front and Right Side Pipe



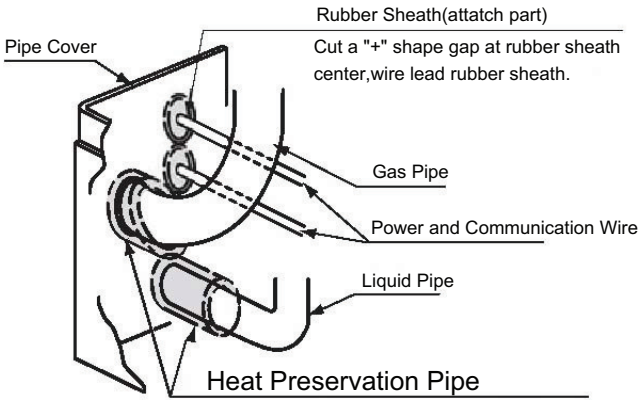
(b) Bottom Side Piping Work



(c) Rear Piping Work



(5) To avoid damage protect cables and pipes with rubber sheath (Field- Supplied).


Rubber Sheath(attatch part)
Pipe Cover
Cut a "+" shape gap at rubber sheath center,wire lead rubber sheath.
Gas Pipe
Power and Communication Wire
Liquid Pipe
Heat Preservation Pipe

To prevent gaps use a rubber bush and insulation (Factory-Supplied) adequately when installing the piping cover. Cut the lower side guide line of the piping cover when attaching work is difficult.

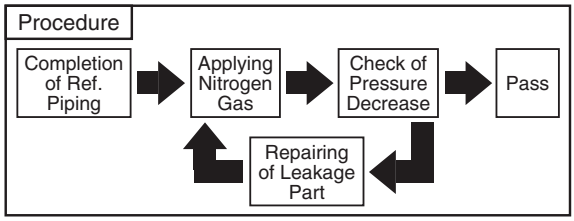
5.5 Air Tight Test

(1) The stop valve has been closed before shipment, however, make sure that the stop valves are closed completely.

(2) Connect the indoor unit and the outdoor unit with field-supplied refrigerant piping.
Suspend the refrigerant piping at certain points and prevent the refrigerant piping from touching the weak part of the building such as wall, ceiling, etc.
(If touched, abnormal sound may occur due to the vibration of the piping. Pay special attention in case of short piping length.)

(3) Apply the oil thinly at the seat surface of the flare nut and pipe before tightening.
And when tightening the flare nut, use two spanners.
Refrigerant Oil is field-supply.

[Model: α68HES-H (Ether Oil)
Manufacturer: IDEMITSU KOSAN Co., Ltd.]



(4) Stop Valve

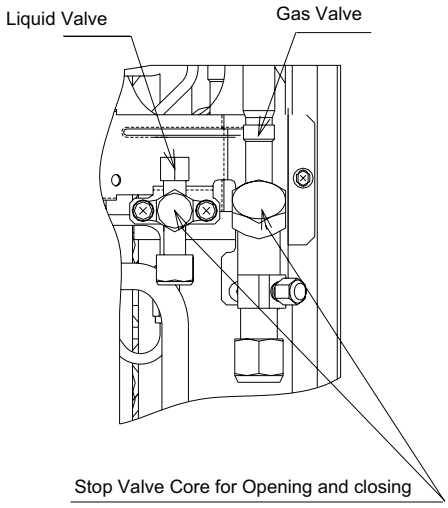
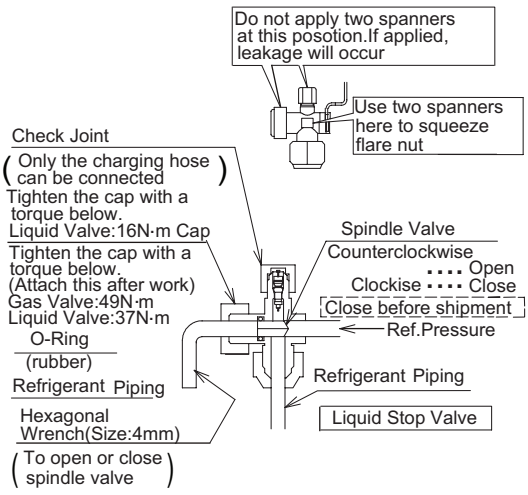


Fig.5.3 Stop Valve Position

Operation of the stop valve should be performed according to the below.

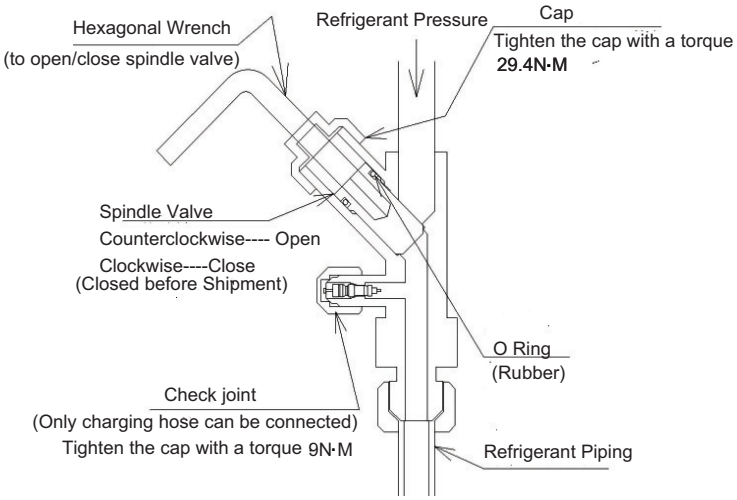
<Liquid Valve>



Spindle Valve Torque (N▪m)

Gas	Liquid
11～14	7～9

<Gas Valve>



Hexagonal Wrench Size (mm)

Gas	Liquid
8	4

⚠CAUTION

- **Do not apply an abnormal big force to the spindle valve at the end of opening (5.0N▪m or smaller).**
  The back seat construction is not provided.
- **Do not loosen the stop ring. If the stop ring is loosened, it is dangerous, since the spindle will hop out.**

(5) Connect the gauge manifold using charging hoses with a nitrogen cylinder to the check joints of the liquid line and the gas line stop valves.
Perform the air-tight test.
Do not open the stop valves. Apply nitrogen gas pressure of 4.15MPa.

(6) Check for any gas leakage at the flare nut connections, or brazed parts by gas leak detector or foaming agent.

(7) After the air tight test, release nitorogen gas.

⚠CAUTION

After pipe and nut cap connected,when make air test , open the stop valve spindle cap,make sure valve closed already(clock wise).

- Tighten nut cap below torque,great torque will bring on refrigerant leakage of valve spindle.

Pipe Diameter	Tighten Torque
Φ6.35(1/4)	14～18N・m
Φ9.53(3/8)	34～42N・m
Φ12.7(1/2)	49～61N・m
Φ15.88(5/8)	68～82N・m

- Make air tighten test after valve spindle turn off closely.

Note:
Do not connect nut cap on test joint,supply for connecting refrigerant charge soft pipe.It have no effect for system capacity when connect jonit cap and valce cap opened together "pu chi" light sound.

5.6 Vacuum Pumping and charge refrigerant

(1) Connect a mani-fold gauge to the check joints at the both sides.
Continue vacuum pumping work until the pressure reaches 756mmHg or lower for one to two hours.
After vacuum pumping work, stop the mani-fold valve's valve, stop the vacuum pump and leave it for one hour. Check to ensure that the pressure in the mani-fold gauge does not increase.

Note:
1. This unit is only for the refrigerant R410A. The manifold gauge and the charging hose should be exclusive use for R410A.
2. If vacuum degree of -0.1MPa (756mmHg) is not available, it is considered of gas leakage or entering moisture. Check for any gas leakage once again. If no leakage exists, operate the vacuum pump for more than one to two hours.

(2) Connect adjusted valve and charge kettle to check joint of liquid valve.

(3) Fully open the gas valve and liquid valve slowly.

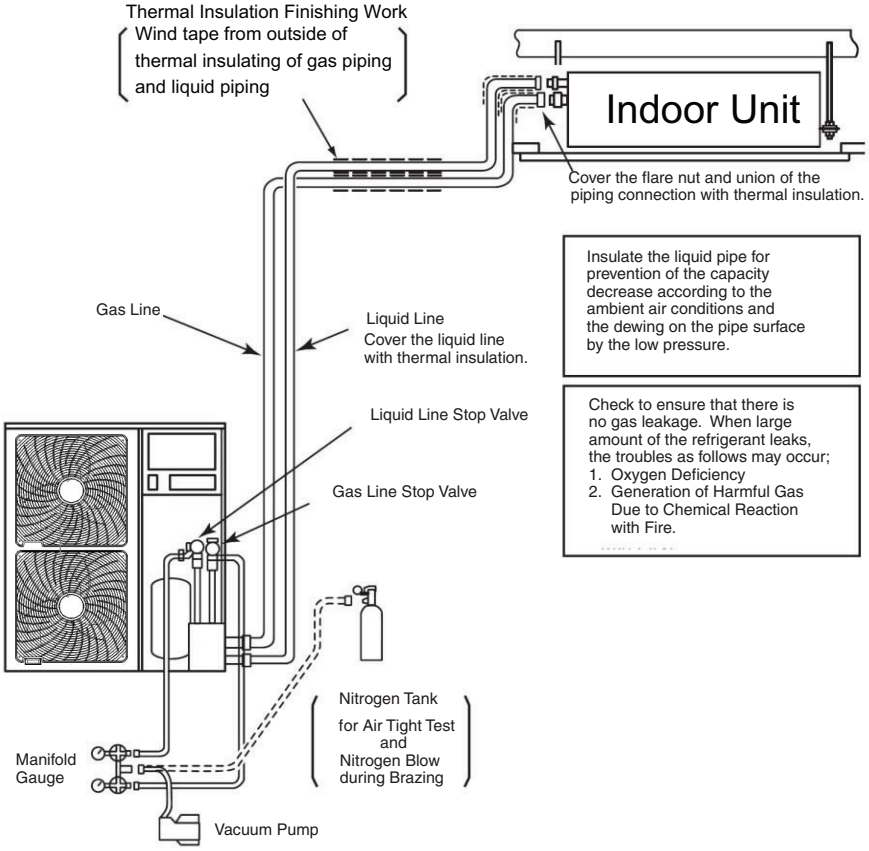
(4) Open adjusted valve to add refrigerant (must be refrigerant is liquid).

(5) Operate cool mode,charge stated refrigerant.

(6) Confirm the capacity of charging refrigerant with balance.an excess or a shortage of refrigerant is cause of trouble to the units.

(7) Fully open the liquid valve.

Never use the refrigerant charged in the outdoor unit for air purging. Insufficient refrigerant will lead to failure.


Thermal Insulation Finishing Work
Wind tape from outside of thermal insulating of gas piping and liquid piping
Indoor Unit
Cover the flare nut and union of the piping connection with thermal insulation.
Insulate the liquid pipe for prevention of the capacity decrease according to the ambient air conditions and the dewing on the pipe surface by the low pressure.
Gas Line
Liquid Line
Cover the liquid line with thermal insulation.
Liquid Line Stop Valve
Gas Line Stop Valve
Check to ensure that there is no gas leakage. When large amount of the refrigerant leaks, the troubles as follows may occur;
1. Oxygen Deficiency
2. Generation of Harmful Gas Due to Chemical Reaction with Fire.
Nitrogen Tank for Air Tight Test and Nitrogen Blow during Brazing
Manifold Gauge
Vacuum Pump

⚠CAUTION

- **At the test run, fully open the spindle. If not fully opened, the devices will be damaged.**
- **An excess or a shortage of refrigerant is the main cause of trouble to the units. Charge the correct refrigerant quantity according to the description of label at the inside of service cover.**
- **Check for refrigerant leakage in detail. If a large refrigerant leakage occurs, it will cause difficulty with breathing or harmful gases would occur if a fire was being used in the room.**

1. Maximum Permissible Concentration of HFC GAS R410A charged in the DC INVERTER is an incombustible and non-toxic gas.
   However, if leakage occurs and gas fills a room, it may cause suffocation. The maximum permissible concentration of HCFC gas, R410A in air is 0.3kg/m^3, according to the refrigeration and air conditioning facility standard (KHK S 0010) by the KHK (High Pressure Gas Protection Association) Japan. Therefore, some effective measure must be taken to lower the R410A concentration in air below 0.3kg/m^3, in case of leakage.

2. Calculation of Refrigerant Concentration
   (1) Calculate the total quantity of refrigerant R (kg) charged in the system connecting all the indoor units of objective rooms.
   (2) Calculate the room volume V (m^3) of each objective room.
   (3) Calculate the refrigerant concentration C (kg/m^3) of the room according to the following equation.

$$\frac{\text{R: Total Quantity of Charged Refrigerant (kg)}}{\text{V: Room Volume (m}^3\text{)}} = \text{C: Refrigerant Concentration} \leq 0.3\ (\text{kg/m}^3)$$

   If local codes or regulations are specified, follow them.

5.7 Caution of the Pressure by Check Joint

When the pressure is measured, use the check joint of gas stop valve ((A) in the figure below) and use the check joint of liquid piping ((B) in the figure below).
At that time, connect the pressure gauge according to the following table because of high pressure side and low pressure side changes by operation mode.

	Cooling Operation	Heating Operation
Check Joint for Gas Stop Valve "A"	Low Pressure	High Pressure
Check Joint for Piping "B"	High Pressure	Low Pressure
Check Joint for Liquid Stop Valve "C"	Exclusive for Vacuum Pump and Refrigerant Charge	

NOTE:
Be careful that refrigerant and oil do not splash to the electrical parts at removing the charge hoses.

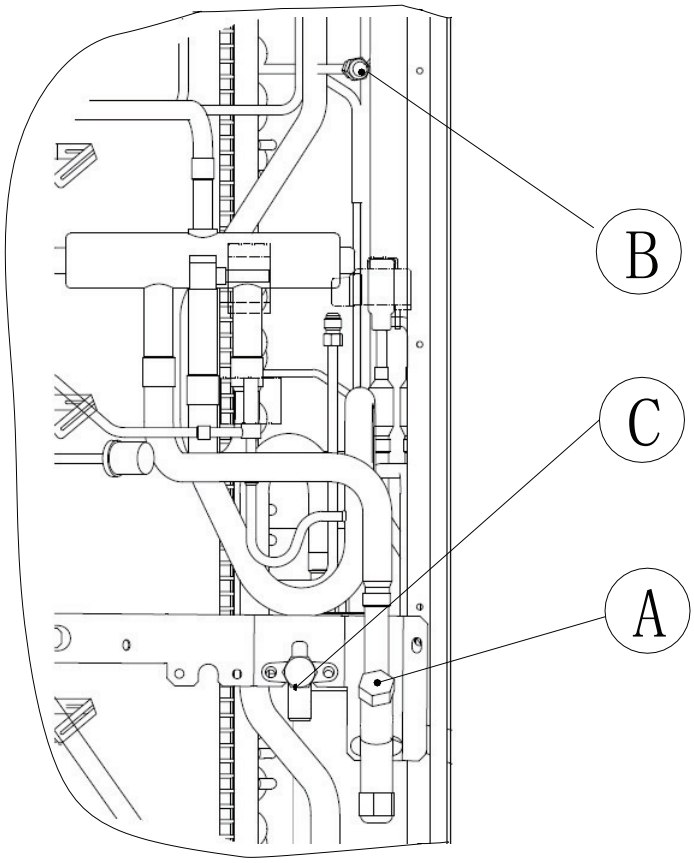


Fig 5.4 Check Joint Position

5.8 Additional Refrigerant Charge

It is necessary additional refrigerant charge as follows.

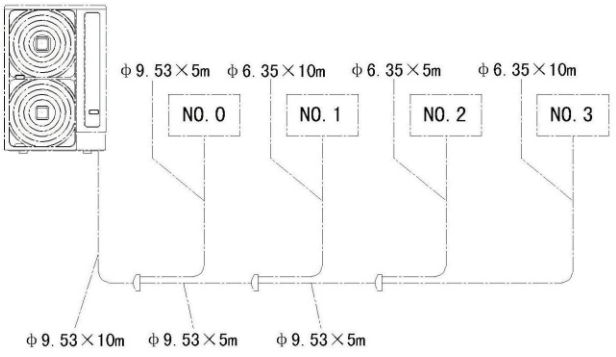
Additional Refrigerant Charge Calculation

Although refrigerant has been charged into this unit, it is required that additional refrigerant be charged according to piping length.

A. Determine an additional refrigerant quantity according to the following procedure, and charge it into the system.
B. Record the additional refrigerant quantity to facilitate service activities thereafter.

1. Calculating Method of Additional Refrigerant Charge (W kg)

<EXAMPLE>
AVW-54UCSC



<Table 1>

(kg)

Outdoor Unit Capacity(KBtu/h)	W0: Outdoor Unit Ref.Charge
38	3.8
48	3.8
54	4.1

NOTE:
W0 is outdoor unit ref. charge before shipment.

See Example for Model AVW-54UCSC, and fill in the following table.

	Pipe Diameter (mm)	Total Piping Length (m)	Additional Charge (kg)
W11=	Φ9.53....	(10+5+5+5)	×0.04=1
W12=	Φ6.35....	(10+10+5)	×0.02=0.50

Total Piping Length 50 m Additional Charge W=W11+W12=1.5 (kg)

	Pipe Diameter (mm)	Total Piping Length (m)	Additional Charge (kg)
W11=	Φ9.53....	[ ]	×0.04 = [ ]
W12=	Φ6.35....	[ ]	×0.02 = [ ]

Total Piping Length [ ] m

Total Ref.Charge W= [ ] + [ ] = [ ] (kg)

2. Charging Work

Charge refrigerant (R410A) into the system as follows.

(1) For charging refrigerant, connect the gauge mani-fold using charging hoses with a refrigerant cylinder to the check joint of the liquid line stop valve.
(2) Fully open the gas line stop valve and slightly open the liquid line stop valve. Charge refrigerant by opening the gauge manifold valve.
(3) Charge the required refrigerant by operating the system in cooling. Ensure to charge correct volume by utilizing a weight scale. An excess or shortage of refrigerant is the main cause of trouble to the units.

Fully open the liquid line stop valve after completing refrigerant charge.

3. Record of Additional Charge

Record the refrigerant charging quantity in order to facilitate maintenance and servicing activities.

Total refrigerant charge of this system is calculated in the following formula.

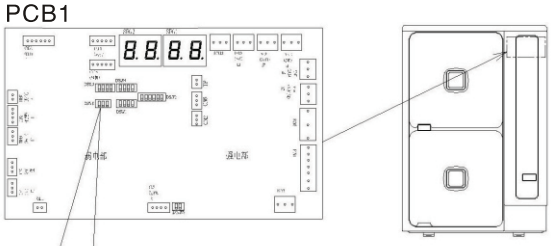
Total Ref. Charge of This System = W + W0
This System = [ ] + [ ] = [ ] kg

Total Additional Charge W	[ ]	kg
Total Ref. Charge of This System	[ ]	kg
Date of Ref. Charge Work		
Day [ ]	Month [ ]	Year [ ]

4. Dip-Switch Setting for Piping Length

Follow below ,setting the Dip-Switch for piping length.

PCB1



DSW6 (Mark" ■ "Show Switch Key Position)

Shipment	I.U.is located higher than O.U.20m	O.U.is located higher than I.U. 25m
ON / OFF	ON / OFF	ON / OFF

5. Notice of Additional Charge

(1) The additional refrigerant need to be reduced 150g for each 12/14 slim ceiling ducted type indoor unit.
(2) The additional refrigerant need to be added if the matched indoor unit and outdoor unit is between 100% ～130% . The additional refrigerant is 150g for each 10% which is over 100% .
(3) The total refrigerant of the unit must be less than 7.9 kg.

5.9 Collecting Refrigerant

When the refrigerant should be collected into the outdoor unit due to indoor/outdoor unit relocation, collect the refrigerant as follows.

(1) Attach the manifold gauge to the gas stop valve and the liquid stop valve.

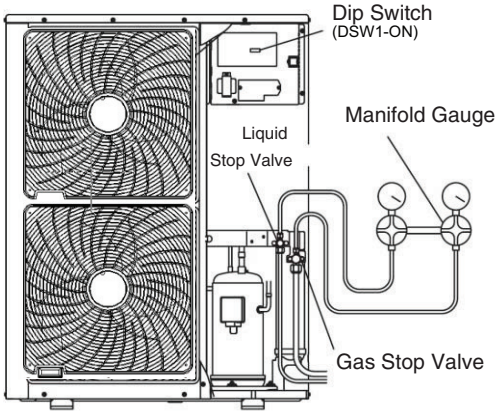
(2) Turn ON the power source.

(3) Set the DSW1-1 pin of the outdoor unit PCB at the “ON” side for cooling operation. Close the liquid stop valve and collect the refrigerant.

(4) When the pressure at lower pressure side (gas stop valve) indicates -0.01MPa (684mmHg), perform the following procedures immediately.

* Close the gas stop valve.
* Set the DSW1-1 pin at the “OFF” side. (To stop the unit operation.)

(5) Turn OFF the power source.



⚠CAUTION

Measure the low pressure by the pressure gauge and keep it not to decrease than -0.01MPa. If the pressure is lower than -0.01MPa, the compressor may be faulty.

6. Electrical Wiring

⚠WARNING

- **Turn OFF the main power switch to the indoor unit and the outdoor unit and wait for more than 1 minute before electrical wiring work or a periodical check is performed.**
- **Check to ensure that the indoor fan and the outdoor fan have stopped before electrical wiring work or a periodical check is performed.**
- **Protect the wires, electrical parts, etc. from rats or other small animals.**
  If not protected, rats may gnaw at unprotected parts and at the worst, a fire will occur.
- **Avoid the wirings from touching the refrigerant pipes, plate edges and electrical parts inside the unit.**
  If not do, the wires will be damaged and at the worst, a fire will occur.

⚠CAUTION

- **Tightly secure the power source wiring using the cord clamp inside the unit.**

6.1 General Check

(1) Make sure that the field-selected electrical components (main power switches, circuit breakers, wires, conduit connectors and wire terminals) have been properly selected according to the electrical data. Make sure that the components comply with National Electrical Code (NEC).

(2) Check to ensure that the voltage of power supply is within ±10% of nominal voltage and earth phase is contained in the power supply wires. If not, electrical parts will be damaged.

(3) Check to ensure that the capacity of power supply is enough.
If not, the compressor will be not able to operate cause of voltage drop abnormally at starting.

(4) Check to ensure that the earth wire is connected.

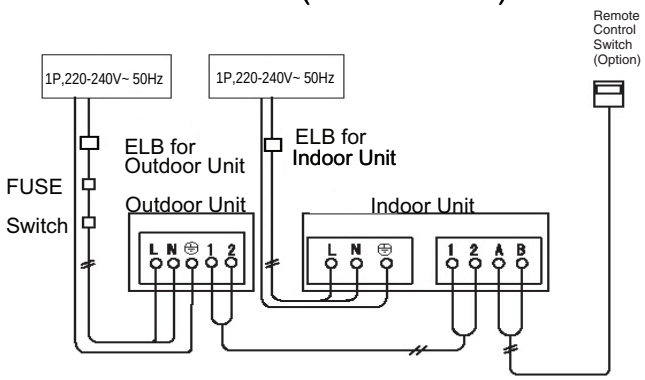
(5) Check to ensure that the electrical resistance is more than 1 megohm, by measuring the resistance between ground and the terminal of the electrical parts.
If not, do not operate the system until the electrical leakage is found and repaired.

6.2 Electrical Wiring Connection

(1) Connect the power supply wires to the terminal board in the electrical control box of both outdoor unit and indoor unit. And connect the earth wire to the electrical control box of outdoor unit.
In addition, connect the earth wire to earth screw in the electrical control box of indoor unit. Refer to Fig. 6.2.

(2) Connect the wires between the outdoor and indoor units to terminals 1 and 2 on the terminal board.
If power supply wiring is connected to 1 and 2 of terminal board (TB1), printed circuit board will be damaged.
Refer to Fig. 6.1.

CORRECT (ONE PHASE)



INCORRECT (ONE PHASE)

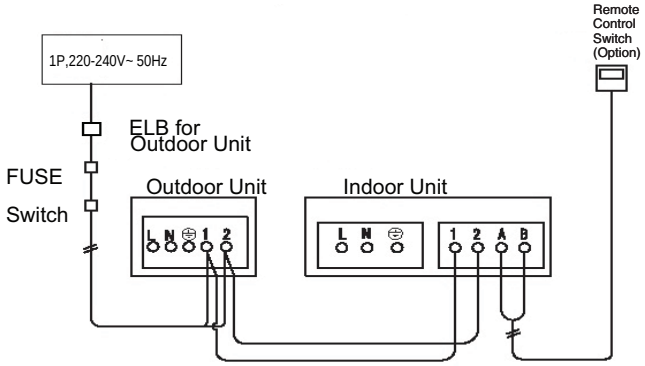


Fig. 6.1 One phase indoor unit and outdoor unit communication wire connection

Do not connect the Power Source Line to the terminal 1 and 2.
These terminals are for the Control.
If connected, the printed circuit board will be damaged.

(3) Do not wire in front of the fixing screw of the service panel. If do, the screw can not be removed.

(4) Use twist pair cable with shielded for control between outdoor unit and indoor unit, control wiring between indoor units, wiring (1 and 2) for remote control switch and transmission wiring (A and B) for remote control switch .

NOTES:

1. In case of total wiring length at intermediate wiring between outdoor unit and indoor unit and between indoor units is less than 100m, it is possible to use the normal wiring (more than 0.75mm^2) except twist pair cable.
2. Total wiring length for remote control switch can be extended up to 500m.
   If total wiring length less than 30m, it is possible to use the normal wiring (0.3mm^2) except twist pair cable.

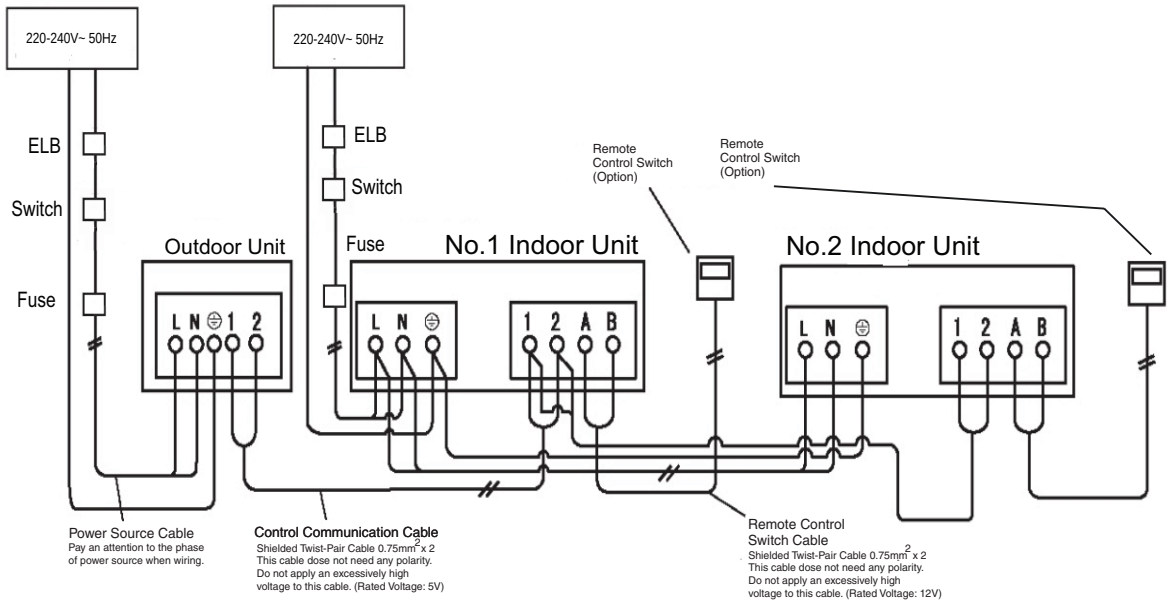

220-240V~ 50Hz
220-240V~ 50Hz
ELB
Switch
Fuse
ELB
Switch
Fuse
Outdoor Unit
No.1 Indoor Unit
No.2 Indoor Unit
Remote Control Switch (Option)
Remote Control Switch (Option)
L N ⏚ 1 2
L N ⏚
1 2 A B
L N ⏚
1 2 A B
Power Source Cable
Pay an attention to the phase of power source when wiring.
Control Communication Cable
Shielded Twist-Pair Cable 0.75mm² x 2
This cable dose not need any polarity.
Do not apply an excessively high voltage to this cable. (Rated Voltage: 5V)
Remote Control Switch Cable
Shielded Twist-Pair Cable 0.75mm² x 2
This cable dose not need any polarity.
Do not apply an excessively high voltage to this cable. (Rated Voltage: 12V)

Fig. 6.2 Wiring Connection for Indoor & Outdoor (1 PHASE)

(5) The recommended fuse sizes etc. are shown in Table 6.1.

(6) In the case that a conduit tube for feild-wiring not used,fix rubber bushes with adhesive on the panel.

⚠WARNING

- **Install an ELB in the power source. If ELB is not used, it will cause electric shock or fire at the worst.**
- **The tightening torque of each screw shall be as follows.**

M4:	**1.0 to 1.3 N-m**
M5:	**2.0 to 2.5 N-m**
M6:	**4.0 to 5.0 N-m**
M8:	**9.0 to 11.0 N-m**
M10:	**18.0 to 23.0 N-m**

Keep the above tightening torque when wiring work.

- **Install main switch and ELB for each system separately. Select the high response type ELB that is acted within 0.1 second.**
- **Separate the control wiring between outdoor unit and indoor unit more than approximately 5 to 6cm from power supply wiring. Do not use a coaxial cable.**

NOTE:

Supply the power source of outdoor units and indoor units respectively.

(1) Power Source Wiring
Power source wiring is fundamentally according to this method.

(1) Power Source Wiring

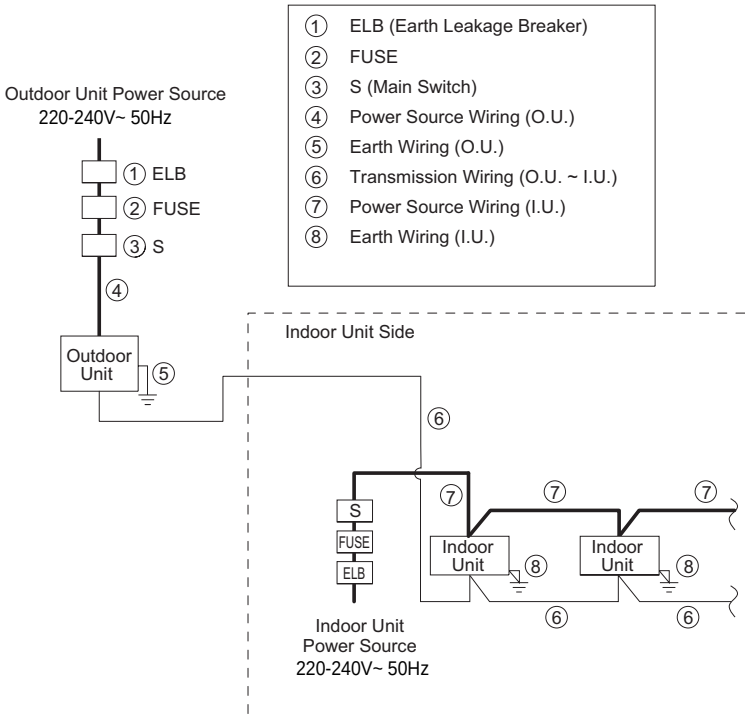


Table 6.1 Electrical Data and Recommended Wiring, Breaker Size/1 Outdoor Unit

Model	Maximum Running Current (A)	Power Source Cable Size EN60335-1 *1 (mm^2)	Transmitting Cable Size EN60335-1 *1 (mm^2)	Earth Wire Size (mm^2)	ELB Nominal Current (A)	ELB Nominal Sensitive Current /(mA)	Fuse (A)
38~54	28	6.0	0.75	6.0	40	30	40

*1 Refer to the NOTES for selection of the power source cable size.

ELB：Earth Leakage Breaker

NOTES:

1) Follow local codes and regulations when selecting field wires.
2) The wire sizes marked with *1 in the above table are selected at the maximum current of the unit according to the European Standard, EN60335-1.Use the wires which are not lighter than the ordinary polychloroprene sheathed flexible cord (code designation H05RN-F).
3) Use a shielded cable for the transmitting circuit and connect it to ground.
4) In the case that power cables are connected in series, add each unit maximum current and select wires below.

Selection According to EN60335-1

Current i (A)	Wire Size (mm^2)
i≤3	1.0~2.5
3<i≤6	1.0~2.5
6<i≤10	1.0~2.5
10<i≤16	1.5~4.0
16<i≤25	2.5~6.0
25<i≤32	4.0~10.0
32<i≤50	6.0~16.0
50<i≤63	10.0~25.0
63<i	*2

5) Run through the cables using conduit tube,and Completely seal the end of conduit tube with sealing materials.

*2 : In the case that current exceeds 63A,Don't series connection

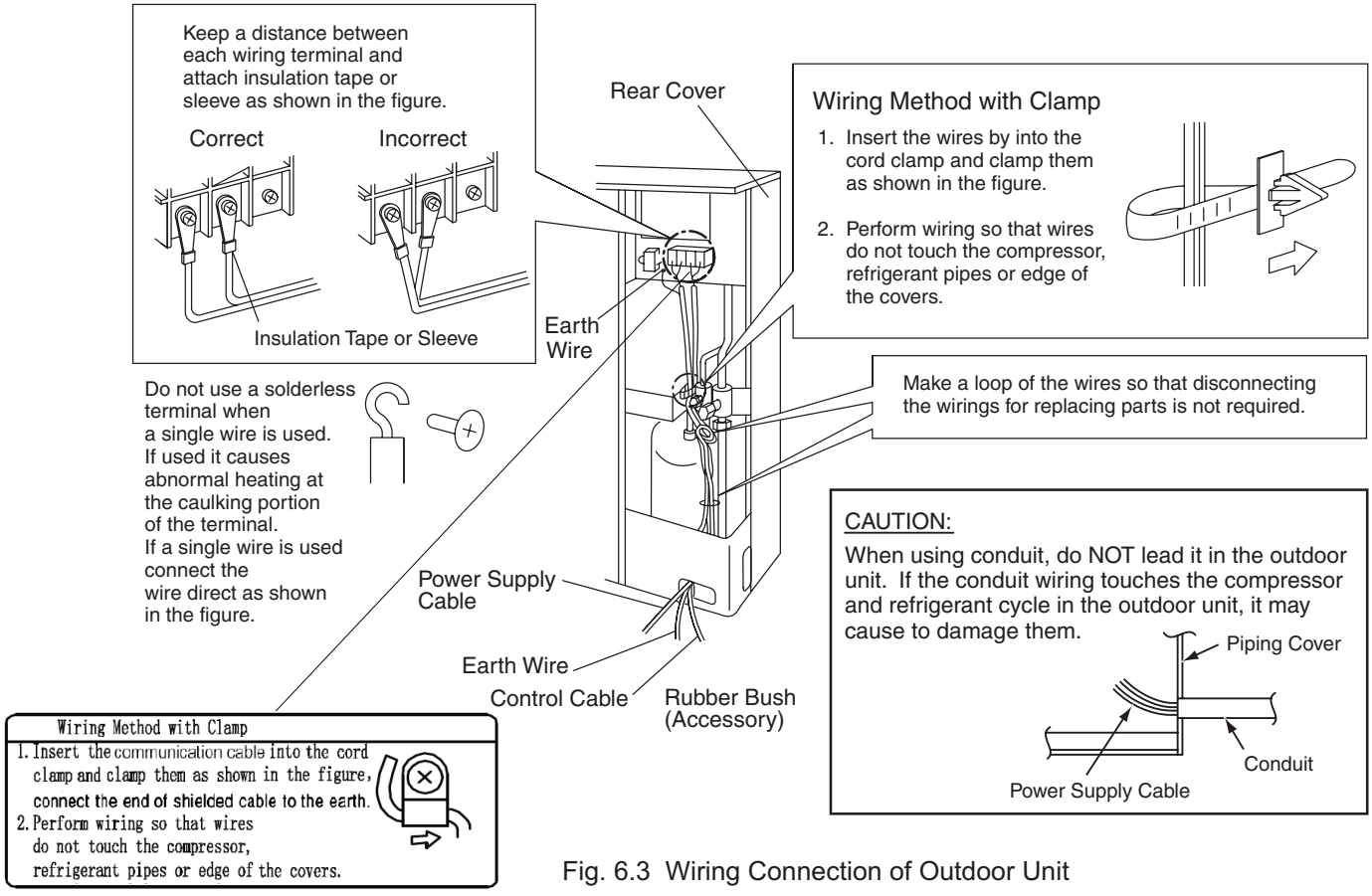

Keep a distance between each wiring terminal and attach insulation tape or sleeve as shown in the figure.
Correct
Incorrect
Insulation Tape or Sleeve
Rear Cover
Wiring Method with Clamp
1. Insert the wires by into the cord clamp and clamp them as shown in the figure.
2. Perform wiring so that wires do not touch the compressor, refrigerant pipes or edge of the covers.
Earth Wire
Do not use a solderless terminal when a single wire is used. If used it causes abnormal heating at the caulking portion of the terminal. If a single wire is used connect the wire direct as shown in the figure.
Make a loop of the wires so that disconnecting the wirings for replacing parts is not required.
Power Supply Cable
Earth Wire
Control Cable
Rubber Bush (Accessory)
CAUTION:
When using conduit, do NOT lead it in the outdoor unit. If the conduit wiring touches the compressor and refrigerant cycle in the outdoor unit, it may cause to damage them.
Piping Cover
Conduit
Power Supply Cable
Wiring Method with Clamp
1. Insert the communication cable into the cord clamp and clamp them as shown in the figure, connect the end of shielded cable to the earth.
2. Perform wiring so that wires do not touch the compressor, refrigerant pipes or edge of the covers.

Fig. 6.3 Wiring Connection of Outdoor Unit

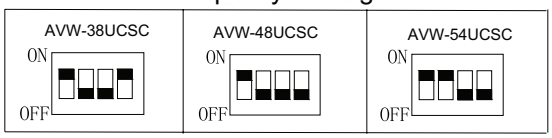
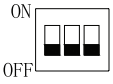
⚠CAUTION

Install a multi-pole main switch with a space of 3.5mm or more between each phase.

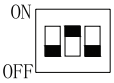
7. Outdoor Unit Dip-Swtich Setting

Turn off all power switch before setting Dip-Switch,else Dip-Switch is of no effect.
Follow this table setting Dip-Switch, " ■ " symbol denote the position of Dip-Switch contact joint.

<table>
<tr><th>DSW1</th><th>DSW2</th><th>DSW4</th><th>DSW5</th></tr>
<tr><td rowspan="2">

ALL OFF:Shipment Set
1 ON: Test Run(Cool)
1、2ON:Test Run(Heat)</td><td>ALL OFF:Shipment Set
5ON: Optional Function Setting
6 ON: Input Power Setting
</td><td>Ref. Cycle No. Setting
</td><td>Communication Setting
</td></tr>
<tr><td colspan="2">DSW3
Capacity Setting
 
</td><td colspan="2">DSW6
Pipe length Setting
Shipment
 

I.U.is located higher than O.U.(>20m)

O.U.is located higher than I.U.(>25m)
 
</td></tr>
</table>

- Communication Setting
  It is necessary to set
  Ref. cycle system No.
  and terminal resistor
  connect to Hi-NET system.

- Setting Ref.cycle system No.
  Setting Ref.cycle (DSW4)

DSW4

High Digit Setting

Ten / A Bit	0	1	2	3	4	~	62	63
0						~		

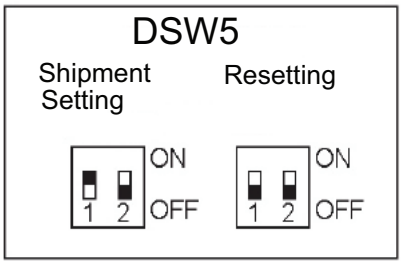
● Terminal Resistor Setting

The first key of DSW5 is "ON" position shipment.

It is not necessary to set when Hi-NET joint one outdoor unit.

It is necessary to set the first key of DSW5 to "OFF" position from the second outdoor unit when a Hi-NET system joint more outdoor unit

Setting Terminal Resistor



8. Test Run

Test run should be performed according to the Table 8.1 on page 24 . And use the Table 8.2 on page 25 for recording test run.

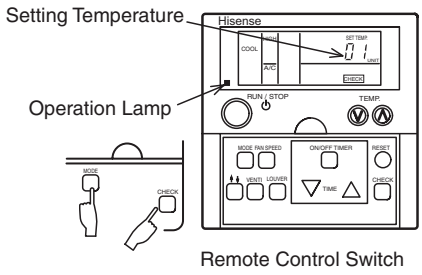
⚠WARNING

- **Do not operate the system until all the check points have been cleared.**
  - **(A) Check and confirm Ref. pipe system and communication wire link to same Ref. cycle system.**
  - **(B) Check to ensure that the electrical resistance is more than 1 megohm, by measuring the resistance between ground and the terminal of the electrical parts. If not, do not operate the system until the electrical leakage is found and repaired.**
  - **(C) Check to ensure that the stop valves of the outdoor unit are fully opened, and then start the system.**
  - **(D) Check to ensure that the switch on the main power source has been ON for more than 12 hours, to warm the compressor oil by the oil heater.**
- **Pay attention to the following items while the system is running.**
  - **(A) Do not touch any of the parts by hand at the discharge gas side, since the compressor chamber and the pipes at the discharge side are heated higher than 90°C.**
  - **(B) DO NOT PUSH THE BUTTON OF THE MAGNETIC SWITCH(ES). It will cause a serious accident.**
- **Do not touch any electrical components for more than three minutes after turning OFF the main switch.**
- **Operate every indoor unit one by one,check and confirm their Ref. cycle and connect wire joint to same Ref. cycle system.**

Table 8.1 Checking of Wire Connection by Test Run

NOTE: "TEST RUN" shall be performed with each refrigerant cycle (each outdoor unit).

(1) Turn ON the power source of the units.
(2) Procedure for "TEST RUN" mode of remote control switch.
Depress the "MODE" and the "CHECK" switches together for more than 3 seconds.



→ If "TEST RUN" and the counting number of the connected units with the remote control switch (for example "05") are indicated on the remote control switch, the connection of remote control cable is correct.

→ If no indication appears or the number of the units indicated is smaller than the actual number of the units, some abnormalities exist.

(3)

Remote Control Switch Indication	Wrong Portions	Inspection Points after the Power Source OFF
No Indication	* The power source of outdoor unit is not turned ON. * The connection of the remote control cable is incorrect. * The connecting wires of power supply line are incorrect or loosed.	1. Connecting Points of Remote Control Cable Terminal Board of Remote Control Switch and Indoor Unit 2. Contact of Terminals of Remote Control Cable 3. Connecting Order of each Terminal Boards 4. Screw Fastening of each Terminal Boards
Counting number of connected units is incorrect.	* The power source of outdoor unit is not turned ON. * The operating line wiring between indoor unit and outdoor unit is not connected.	

Back to (1) after checking

(4) Select TEST RUNNING MODE by depressing "MODE" switch. (COOL or HEAT)
(5) Depress "RUN/STOP" switch.

→ The "TEST RUN" operation will be started. (The 2 hours OFF-TIMER will be set and the "TEST RUN" operation will be finished after 2 hours unit operation or by depressing the "RUN/STOP" switch again.)
NOTE:
The "TEST RUN" operation ignores the temperature limitation and ambient temperature during heating operation to have a continuous operation, but the protections are alive.
Therefore, the protection may activate when the heating "TEST RUN" operation is performed in high ambient temperature.

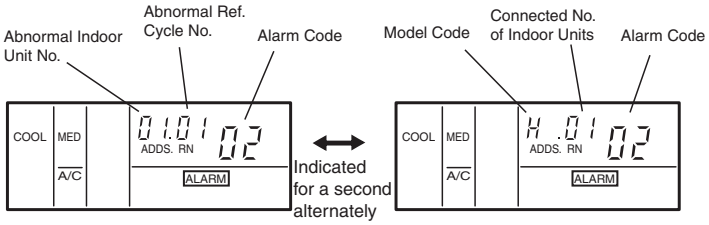
→ If the units do not start or the operation lamp on the remote control switch is flashed, some abnormalities exist.

(6)

Remote Control Switch Indication	Unit Condition	Wrong Portions	Inspection Points after the Power Source OFF
The operation lamp flashes. (1 time/1 sec.) And the Unit No. and Alarm Code "03" flash.	The unit does not start.	The power source of outdoor unit is not turned ON. The connecting wires of operating line are incorrect or loosed.	1. Connecting Order of each Terminal Boards 2. Screw Fastening of each Terminal Boards NOTE: Recovering method of FUSE for operating circuit. There is a fuse ("FUSE4" on Indoor Unit PCB1, "EF1" on Outdoor Unit PCB1) to protect operating circuit on the PCB, when the power lines are connected to operating lines. If fuse is melted, operating circuit can be recovered once by setting the dip switch on the PCB, as below. Indoor Unit PCB1 DSW7 ON OFF 1 2 * Set the switch #1 to ON position to recover the operation circuit.
The operation lamp flashes. (1 time/2 sec.)	The unit does not start.	Remote control cable is broken. Contact of connectors is not good. The connection of remote control cable is incorrect.	This is the same as items (3)-1 and 2.
Indication or flash except above.	The unit does not start, or starts once and then stops.	The connection of the thermistors or other connectors are incorrect. Tripping of protector exists, or elses.	Check by the abnormality mode table 8.3. (Do it by service people.)
The operation lamp flashes. (1 time/1 sec.) And the Unit No. ***00***. Alarm Code ***dd*** and Unit Code ***E.00*** flash.	The unit does not start.	The connection of the remote control cable between indoor units is incorrect.	Check by the abnormality mode table 8.3. (Do it by service people.)

Back to (1) after checking

● Alarm Code Indication of Remote Control Switch



Model Code

Indication	Model
H	Heat-pump
P	Inverter
F	Multi
C	Cooling Only
E	Others

Table 8.2 Test Run and Maintenance Record

MODEL:	SERIAL. No.	COMPRESSOR MFG. No.
CUSTOMER'S NAME AND ADDRESS:		DATE:

1. Is the rotation direction of the indoor coil fan correct? ☐
2. Is the rotation direction of the outdoor coil fan correct? ☐
3. Are there any abnormal compressor sounds? ☐
4. Has the unit been operated at least twenty (20) minutes? ☐
5. Check Room Temperature

Inlet:	No. 1 DB /WB °C,	No. 2 DB /WB °C,	No.3 DB /WB °C,	No.4 DB /WB °C
Outlet:	DB /WB °C,	DB /WB °C,	DB /WB °C,	DB /WB °C

6. Check Outdoor Ambient Temperature

Inlet:	DB °C,	WB °C
Outlet:	DB °C,	WB °C

7. Check Refrigerant Temperature
   - Liquid Temperature: °C
   - Discharge Gas Temperature: °C
8. Check Pressure
   - Discharge Pressure: MPa
   - Suction Pressure: MPa
9. Check Voltage
   - Rated Voltage: V
   - Operating Voltage: V,
   - Starting Voltage: V
10. Check Compressor Input Running Current
    - Input: kW
    - Running Current: A
11. Is the refrigerant charge adequate? ☐
12. Do the operation control devices operate correctly? ☐
13. Do the safety devices operate correctly? ☐
14. Has the unit been checked for refrigerant leakage? ☐
15. Is the unit clean inside and outside? ☐
16. Are all cabinet panels fixed? ☐
17. Are all cabinet panels free from rattles? ☐
18. Is the filter clean? ☐
19. Is the heat exchanger clean? ☐
20. Are the stop valves open? ☐
21. Does the drain water flow smoothly from the drain pipe? ☐

Table 8.3 Alarm Code

Code No.	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activating of Protection Device	High Water Level in Drain Pan, Activated Float Switch.
02	Outdoor Unit	Activating of Protection Device (Except Alarm Code 41 and 42)	Activated High Pressure Switch. Locked Motor in Cooling Operation. Abnormality of Power Supply Phase
03	Transmission	Abnormality between Indoor and Outdoor	Incorrect Wiring. Loose Terminals, Disconnected wire, Tripping of Fuse.
04		Abnormality between Inverter and Control PCB	Failure in Transmission of PCB for Inverter.
05	Supply Phases	Abnormality of Power Supply Phases (for 220V/60Hz Unit Only)	Abnormal Waveform of one or more the Supply Phases (Ex. Distortion of the Voltage Signal).
06	Voltage Drop	Voltage Drop by Excessively Low or High Voltage to Outdoor Unit	Voltage Drop of Power Supply Insufficient Capacity of Power Supply Wiring.
07	Cycle	Decrease of Discharge Gas Superheat	Discharge Gas SUPERHEAT less than 10 deg. is maintained for one hour.
08		Increase of Discharge Gas Temperature	Temperature of the top of Compressor: Td Td $\geq$ 127°C(Cooling), Td $\geq$ 120°C(Heating) over 10 minutes, or Td $\geq$ 140°C over 5 seconds.
11	Sensor on Indoor Unit	Inlet Air Thermistor	Failure of Thermistor, Loose Terminal, Disconnected Wire.
12		Outlet Air Thermistor	
13		Freeze Protection Thermistor	
14		Gas Piping Thermistor	
19		Tripping of Protection Device	Activated Internal Thermo of Fan Motor.
20	Sensor on Outdoor Unit	Compressor Thermistor	Failure of Thermistor, Loose Terminal, Disconnected Wire. Locked Motor in Heating Operation.
22		Outdoor Air Thermistor	
24		Evaporating Thermistor	
31	System	Incorrect Capacity of Outdoor and Indoor Unit	Incorrect Setting of Capacity Combination or Incorrect O.U. Capacity Setting.
35		Incorrect Indoor Unit No. Setting	Duplication of Indoor Unit No.
38		Abnormality of Protective Circuit in outdoor Unit	Failure of Protection detecting Circuit
41	Pressure	Overload cooling (Possibility of high pressure device activation.)	O.U. Pipe Thermistor Temp. is Higher than 55°C and the Comp. Top Temp. is Higher than 95°C when O.U. Protection Device is activated.
42		Overload heating (Possibility of high pressure device activation.)	I.U. Freeze Protection Thermistor Temp. is Higher than 55°C and the Comp. Top Temp. is Higher than 95°C when O.U. Protection Device is activated.
47		Activation of Low Pressure Decrease Protection Device	Stoppage by Excessively Decrease of evaporating Temperature (Te $\leq$ -35°C) is activated 3 times in one hour, Locked Motor in Heating Operation.
51	Inverter	Abnormality of Current Sensor for Inverter	Failure of Control PCB1, IPM or PCB2
52		Overcurrent Protection Activation	Failure of IPM or PCB2, Clogging of Heat Exchanger.
53		Protection Activation of IPM or PCB2	IPM or PCB2 Abnormality Failure of Compressor, clogging of Heat Exchanger.
54		Inverter Fin Temperature Increase	Abnormal Inverter Fin Thermistor, Clogging of Heat Exchanger Abnormal Outdoor Fan
55		IPM or PCB2 Abnormality	Failure of IPM or PCB2
57	Outdoor Fan	Fan Motor Abnormality	Disconnected wire or Incorrect wiring between Control PCB and Inverter PCB. Incorrect Wiring or Fan Motor Abnormality
59	Inverter	Thermistor of Inverter Fin Abnormality (for Inverter Fin Temp.)	Loose Connector, Disconnected Wire, Short Circuit
b1	Indoor Unit No. Setting	Incorrect Unit No. Setting	Over 64 I.U. Setting by Ref. No. or I.U. Address.
EE	Compressor	Compressor Protection Alarm	Failure of Compressor.

9. Safety and Control Device Setting

● Compressor Protection

High Pressure Switch: This switch cuts out the operation of the compressor when the discharge pressure exceeds the setting.

Outdoor Unit Model(KBtu/h)		38 ~ 54
For Compressor Pressure Switch High Pressure Cut-Out	M Pa	Automatic Reset,Non-Adjustable $4.15^{-0.05}_{-0.20}$
Cut-In	M Pa	$3.2^{+0.15}_{-0.20}$
Fuse on Main Circuit	A	50
Compressor Crank Heater Power	W	60+28
CCP Timer Set Time	Min	Non-Adjustable 3
Control Circuit Fuse	A	5

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